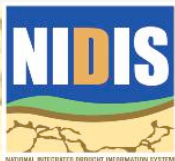


The NIDIS Pilot Drought Early Warning System for the Upper Colorado River Basin

Jim Verdin (USGS)

Nolan Doesken (Colorado State University)

Roger Pulwarty, Lisa Darby, and Chad McNutt (NOAA)



**Planning the NIDIS California Pilot
September 23, 2010
La Jolla, California**

Upper Colorado River Basin Pilot

Federal interagency planning workshop

Identify target user groups and geographic extents

Large reservoir operators

Water providers dependent on inter-basin transfers

Ecosystem managers – forest, range, recreation, tourism

Scoping workshop with targeted user groups

Priority actions identified

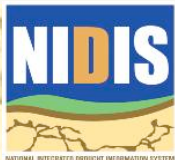
Collaborative process for basin drought monitoring

Supporting research, applications, and services

Drought indicators/triggers

Assessment of gaps

Facilitated web access



Planning the NIDIS California Pilot
September 23, 2010
La Jolla, California

Targeting Criteria

Macro scale: *coordinated operation of Lakes Powell and Mead*
(decided without much debate)

Micro scale: *inter-basin transfers and ecosystems*

Criteria for sub-basin selection included:

- Inter-basin transfer site

- Both urban and agricultural use at issue

- Good prospects for stakeholder participation

- Riparian rangeland and forest ecosystem stress

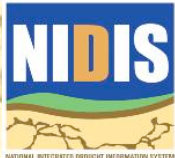
- Tourism / Recreation

- Tribal interests

- Reservoir operations

- Multiple management entities

- Sensitivity to climate change and variability



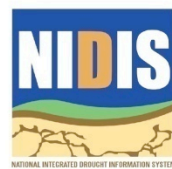
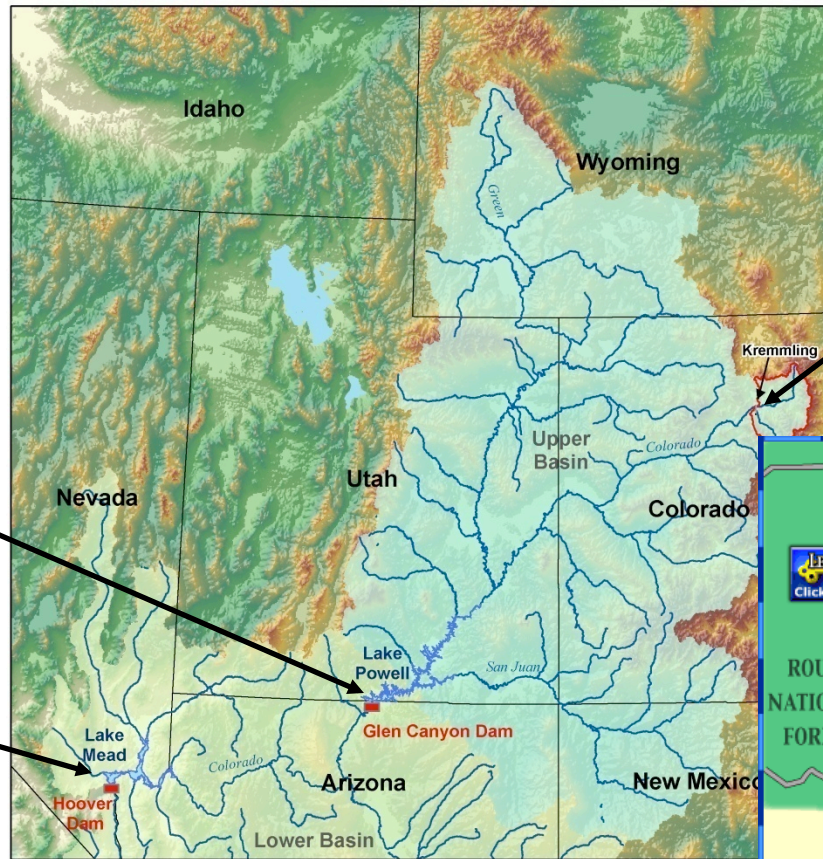
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September 23, 2010
La Jolla, California

Pilot Implementation Upper Colorado River Basin

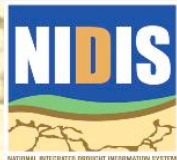
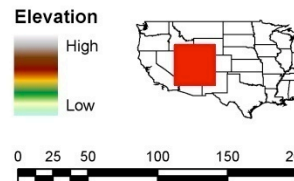
Lake Powell

Lake Mead

Kremmling



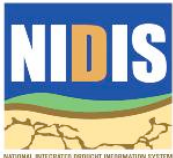
- States
- Dams
- Streams
- Reservoirs
- Upper Basin
- Lower Basin



Scoping Workshop for the UCRB Pilot

Explore existing mandates, decision cycles, and organizational capacities to guide implementation of the pilot

- Colorado Division of Water Resources (CDWR)
- Colorado State Climatologist
- Colorado River Water Conservation District (CRWCD)
- Colorado Water Conservation Board (CWCB)
- CU – Western Water Assessment, CIRES, and CADSWES
- Denver Water Board
- Northern Colorado Water Conservancy District (NCWCD)
- Wyoming State Engineer
- Wyoming State Climatologist
- Utah State Climatologist
- Western Regional Climate Center
- National Center for Atmospheric Research (NCAR)
- National Drought Mitigation Center (NDMC)
- USDA: Natural Resources Conservation Service
- USFS: Region 2
- USBR: Eastern Colorado Area Office, Great Plains Region, Office of Policy and Programs, Research and Development
- USGS: Colorado Water Science Center, Central Region, Grand Canyon Monitoring and Research Center
- NOAA: Earth System Research Laboratory, National Centers for Environmental Prediction, National Climatic Data Center, National Weather Service

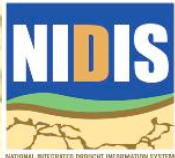


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September 23, 2010
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Interviews and Focus Groups

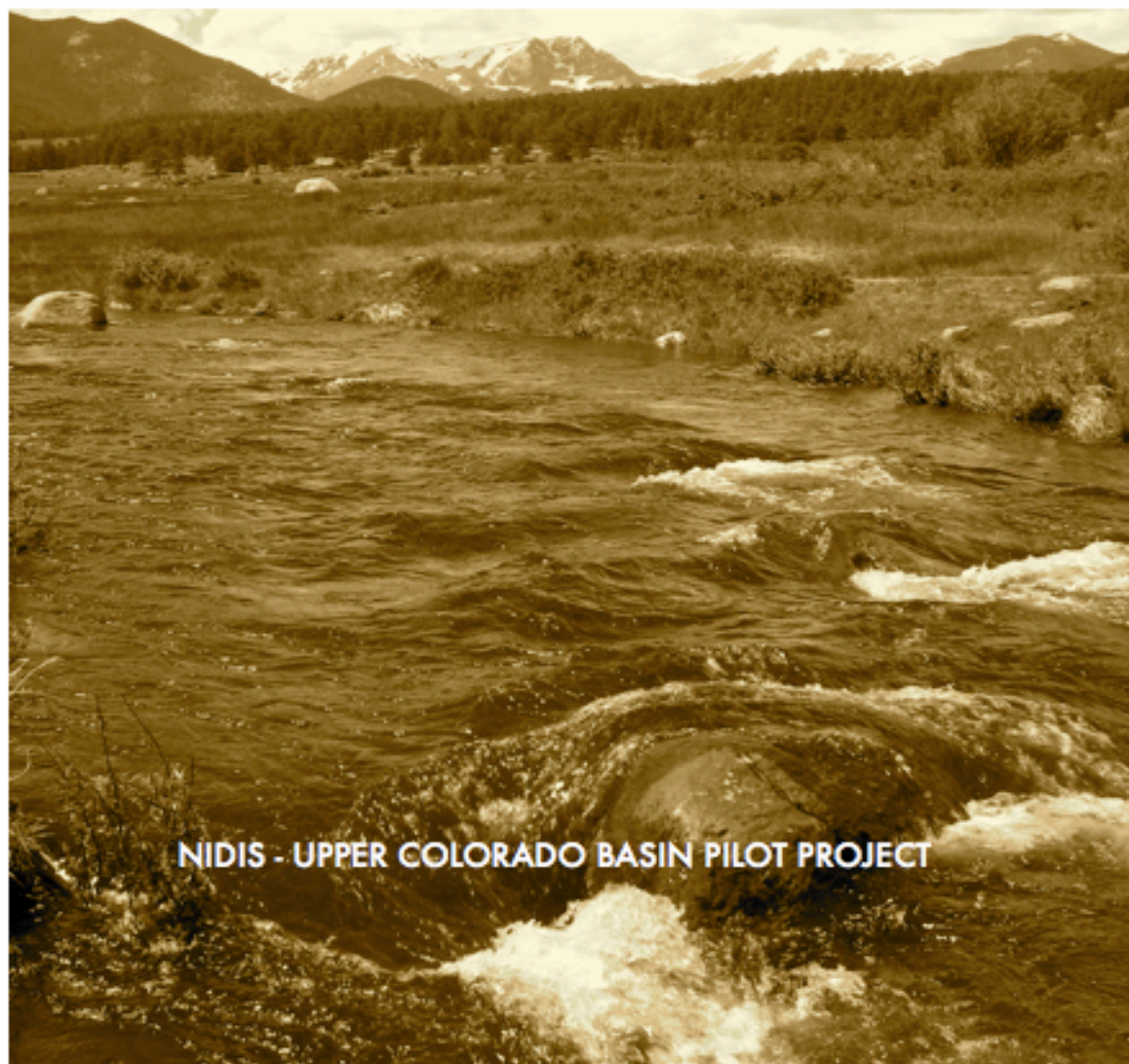
**conducted by the Colorado State Climatologist exploring
drought indicators, triggers and data needs by sector**

- **USBR (Grand Junction and Loveland offices)**
- **Colorado Division of Wildlife**
- **Colorado DNR (state and local)**
- **Denver Water and other smaller water providers**
- **Northwest Council of Governments (water quality)**
- **NGO Watershed protection groups**
- **BLM, NPS and other resource managers**
- **Colorado River Water Conservation District**
- **Northern Colorado Water Conservancy District**
- **EXCEL Energy**
- **Grand County interest group**
- **Summit County interest group**
- **Fraser Experimental Forest**
- **Water Availability Task Force**
- **Winter Park Resorts and other ski area representatives**
- **WY and UT State Climatologists**



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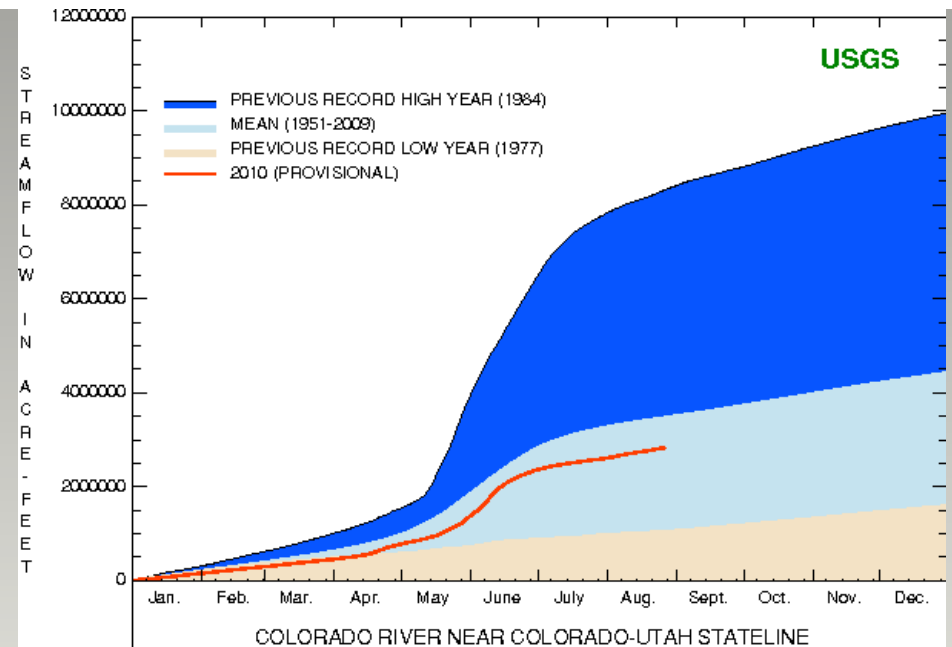
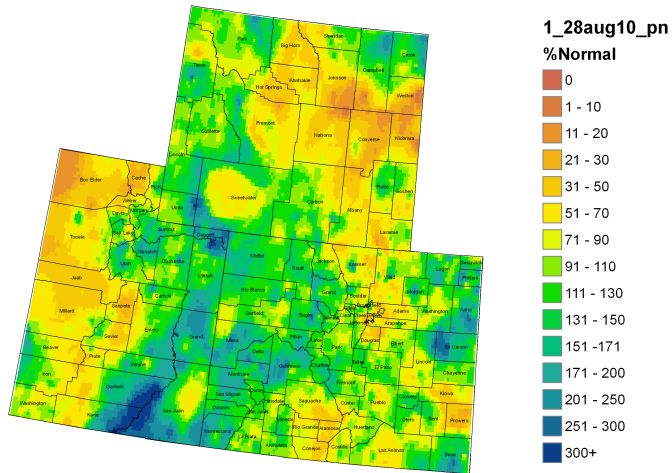
Spring 2010



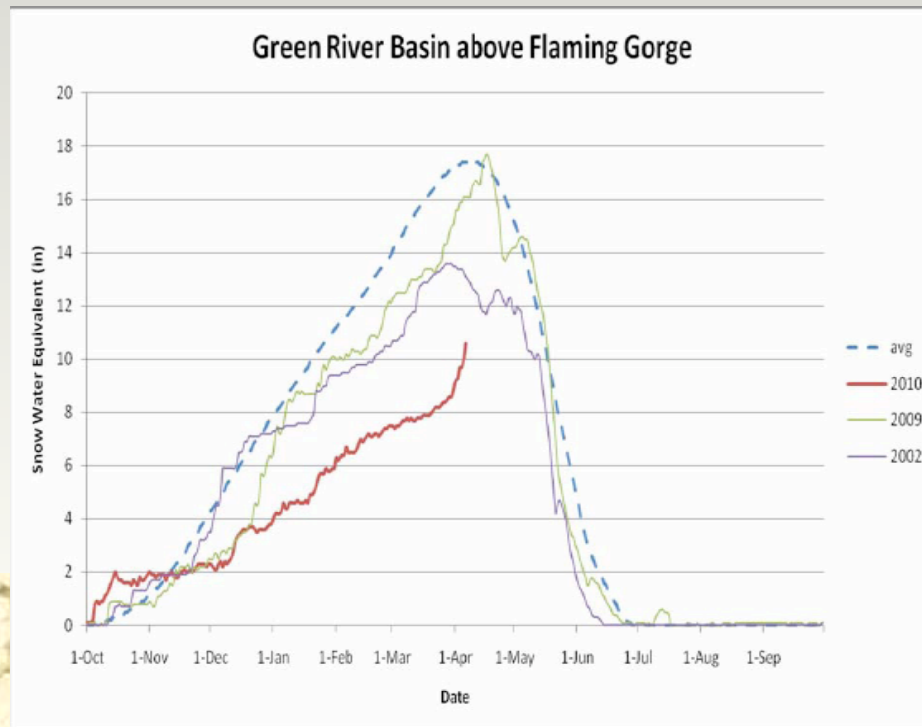
NIDIS - UPPER COLORADO BASIN PILOT PROJECT

Weekly Climate, Water & Drought Assessment

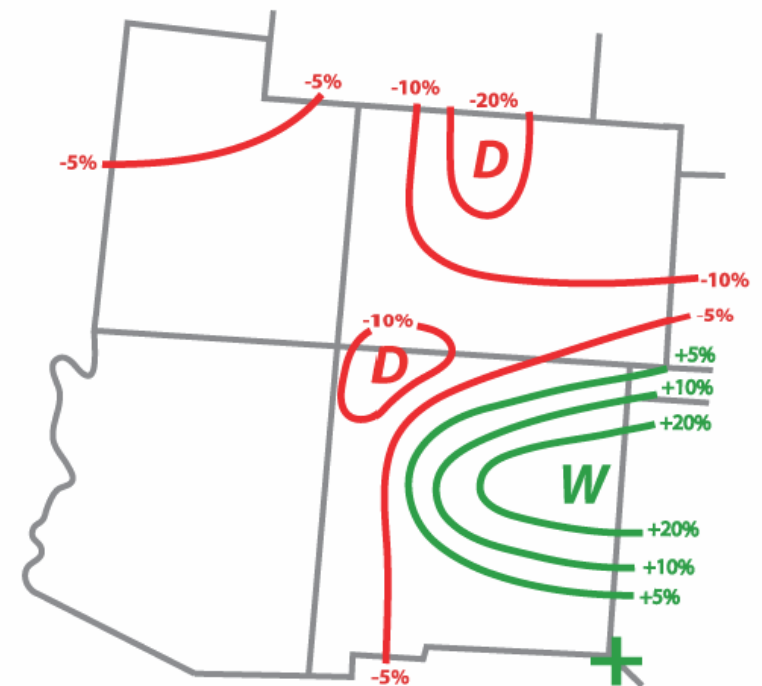
Colorado, Utah and Wyoming Month To Date Precipitation 1 - 28 August 2010 as Percentage of Normal



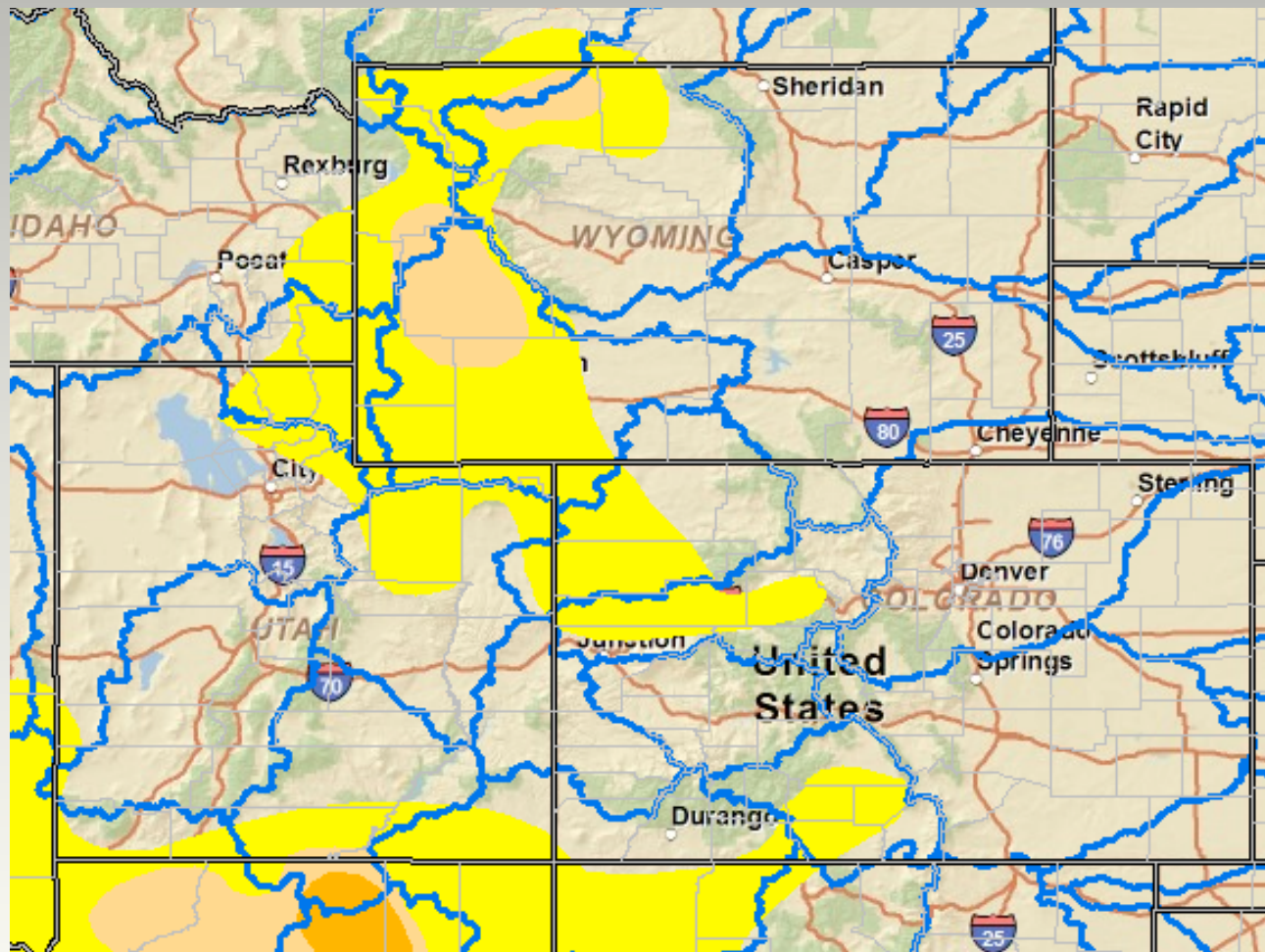
Monitoring and forecast products



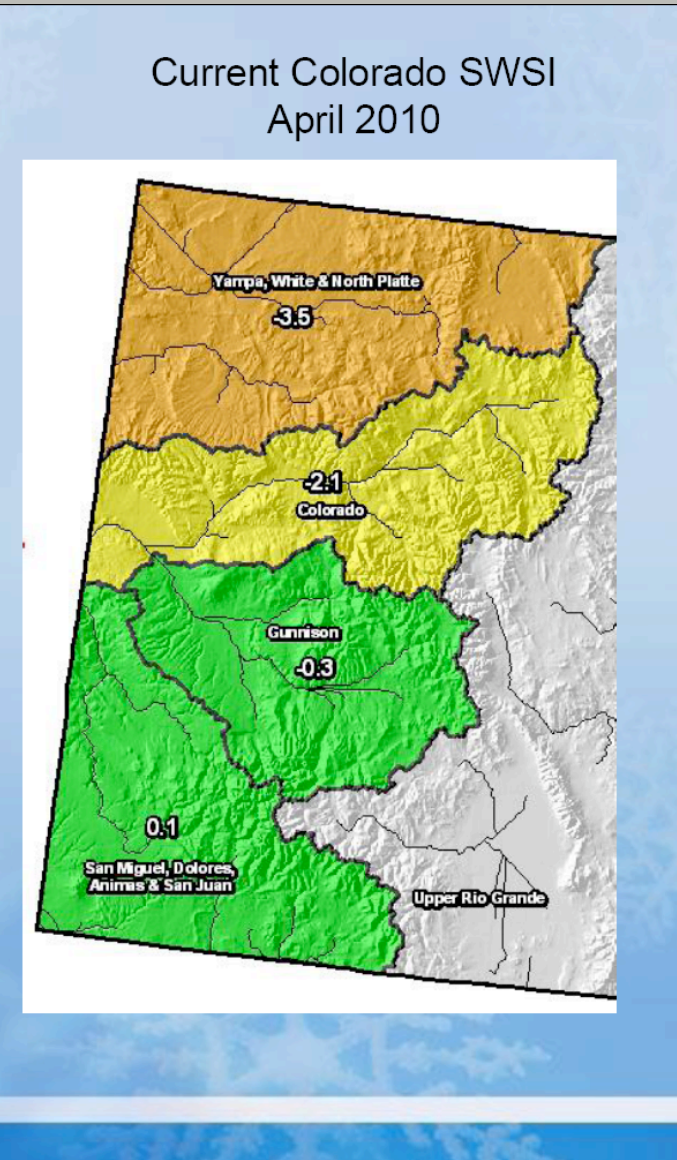
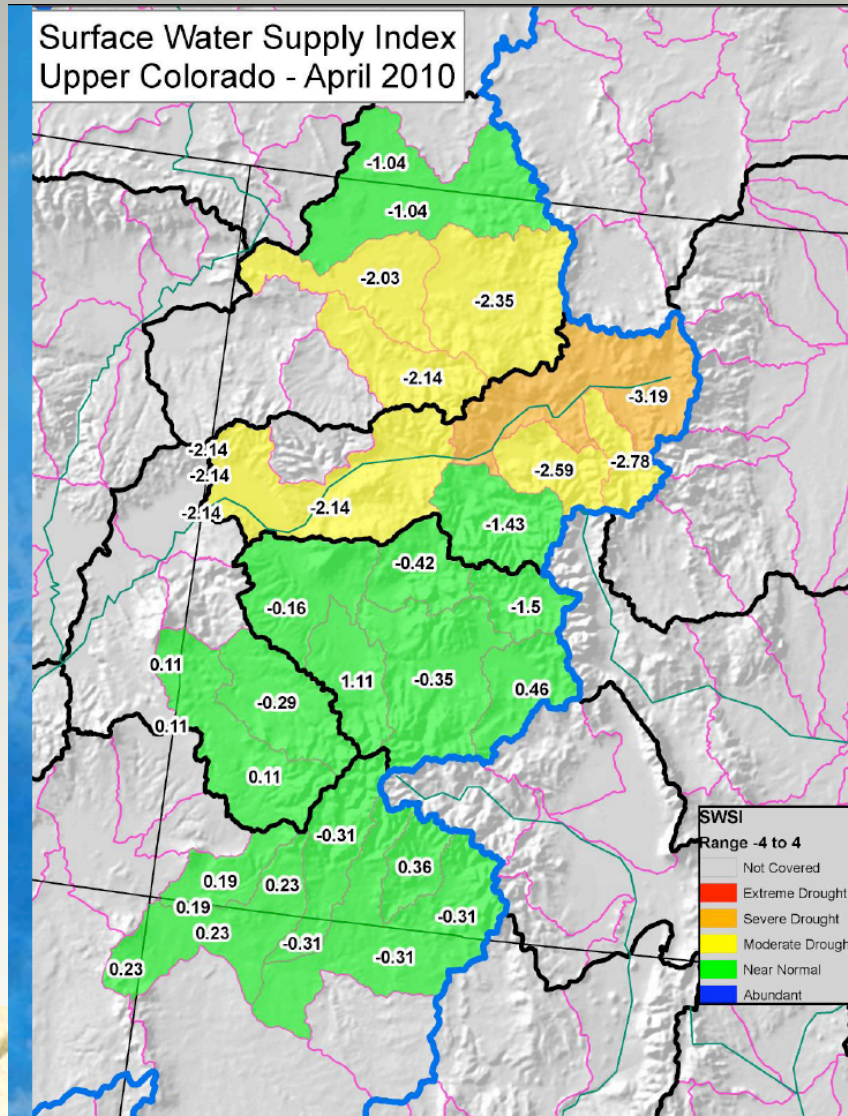
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r 23, 2
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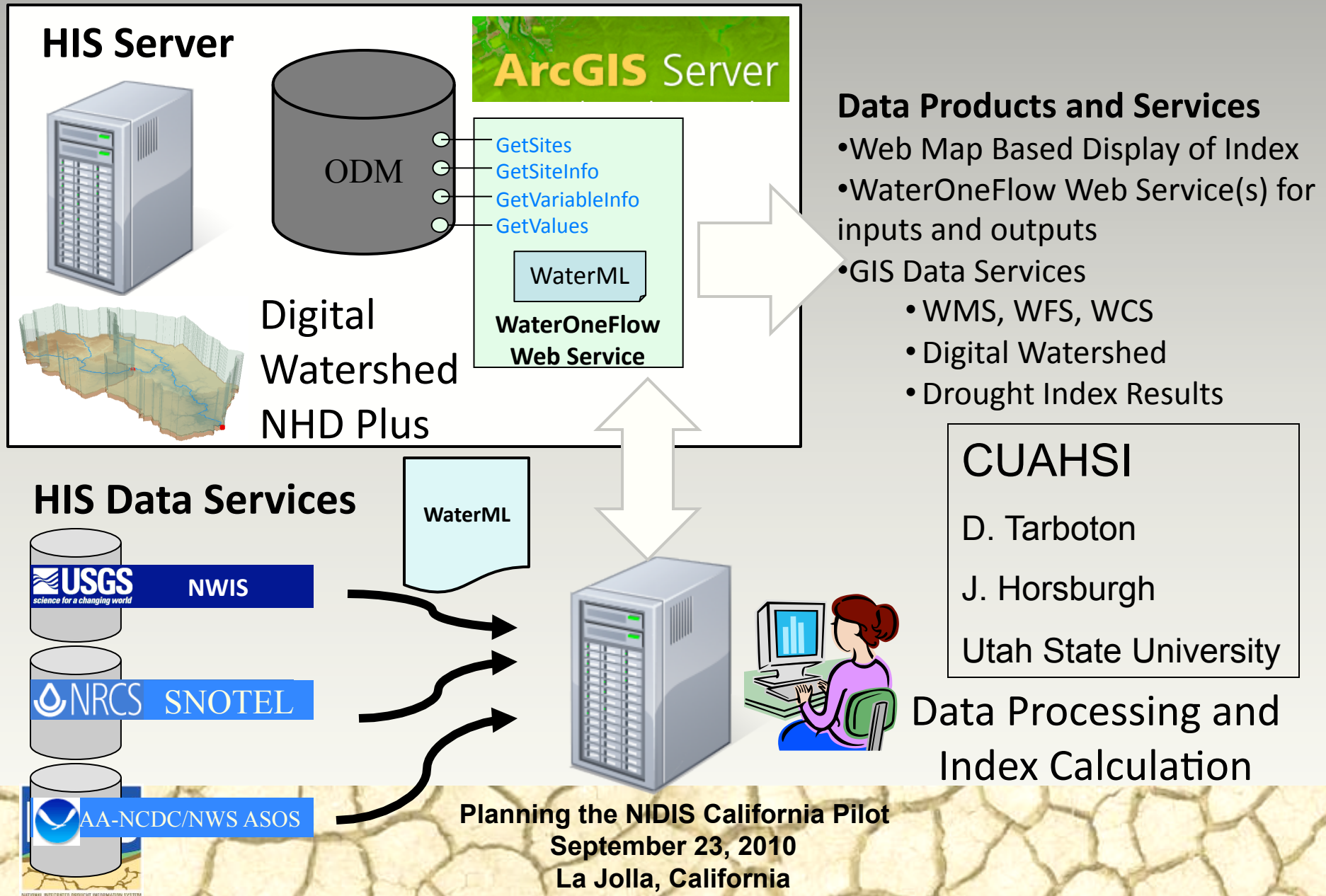
Consensus recommendation to USDM author



NRCS Revised Surface Water Supply Index (SWSI) for Colorado



CUAHSI HIS Custom Drought Index Server



Monitoring Gaps Assessment

NRCS SNOTEL

Existing 117 SNOTEL stations (CO 66, UT 33, WY 18)

Addition of soil moisture instrumentation underway

Estimate an additional 66 SNOTEL stations needed in the UCRB
(CO 36, UT 29, WY 1)

USGS Stream Gages

Re-establishment of selected long-term gaging stations
especially for “indicator basins” without storage or diversions

Real time estimates of native flow in historic perspective for
stations with long records

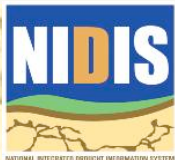
Detailed study underway by Utah WSC with support of USGS
Climate Effects Network

Reservoir Storage

Only half the reservoirs are monitored by USBR and USGS

A very labor intensive process by NRCS for the rest

Additional automated monitoring of levels is needed



Planning the NIDIS California Pilot
September 23, 2010
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Monitoring Gaps Assessment

Precipitation

Need for better low elevation monitoring - RAWS tipping buckets are problematic in cold season

Need for better monitoring in water use areas, to appreciate impact on demand for stored surface water supplies

Daily Gridded Climatological Products

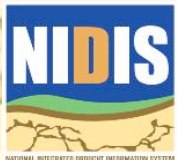
Snow water equivalent

Precipitation

Evapotranspiration (reference ET)

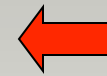
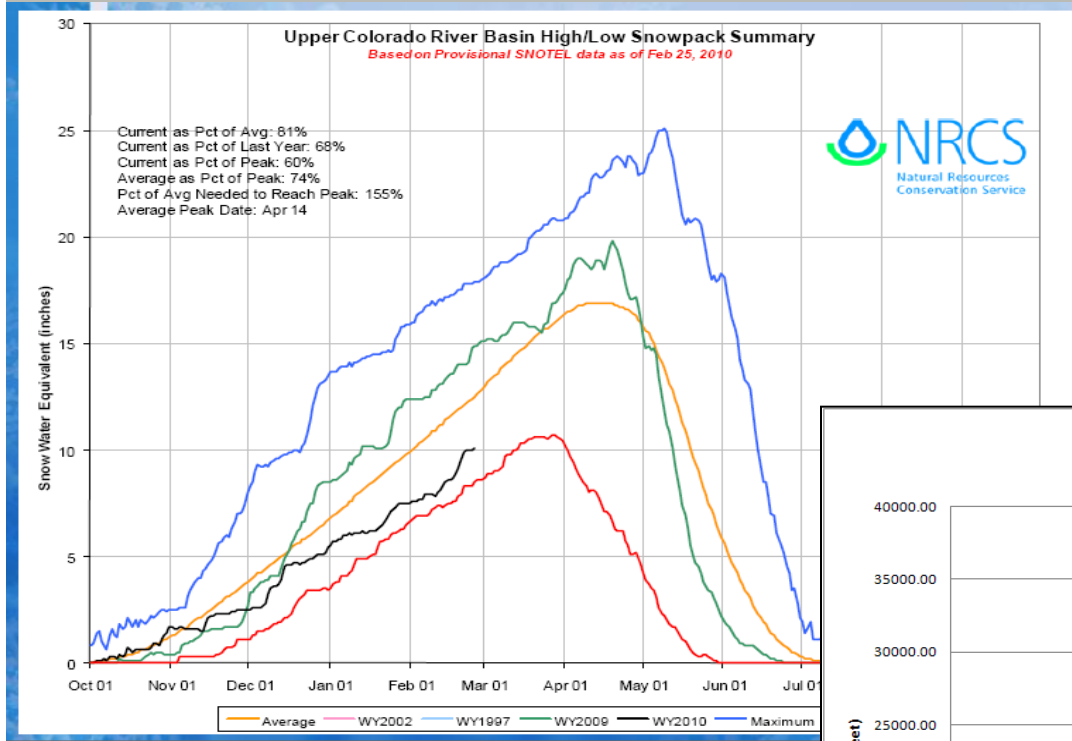
Processes

Relative impacts of soil moisture and sublimation on the fate of the seasonal snow pack

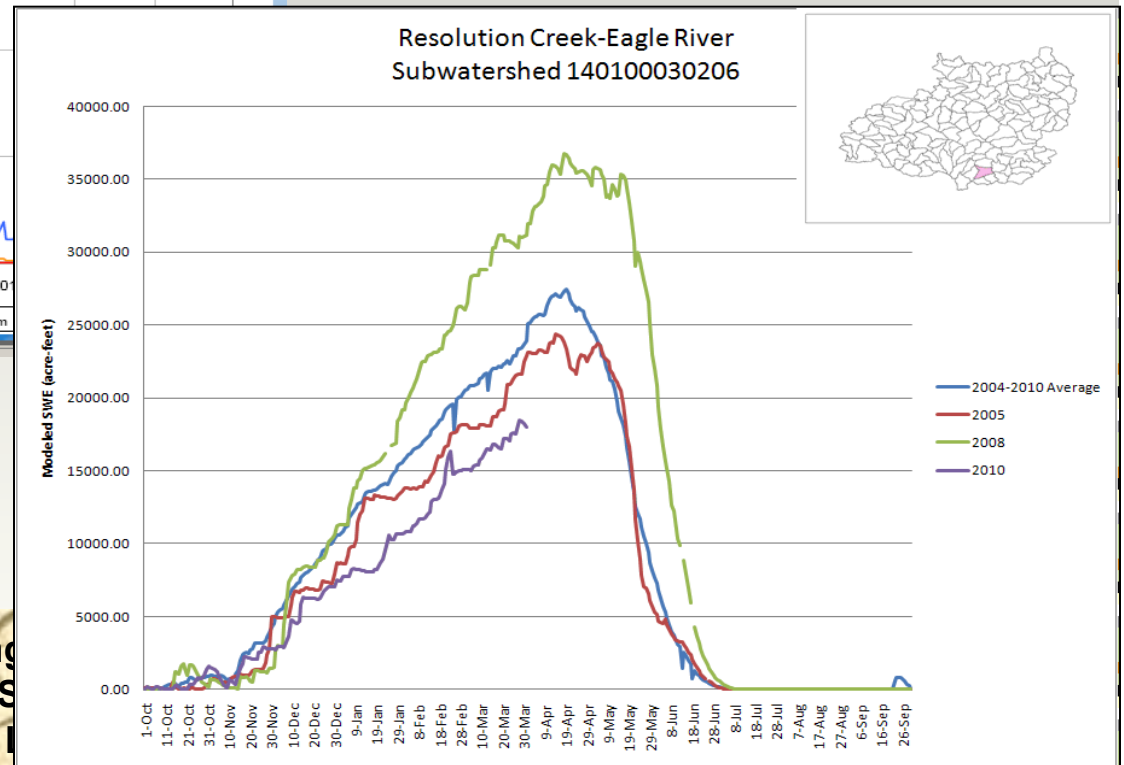


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September 23, 2010
La Jolla, California

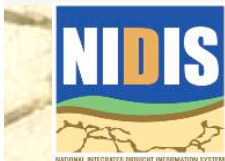
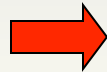
NWS modeled SWE charts on the web NOHRSC and NCDC



NRCS SNOTEL

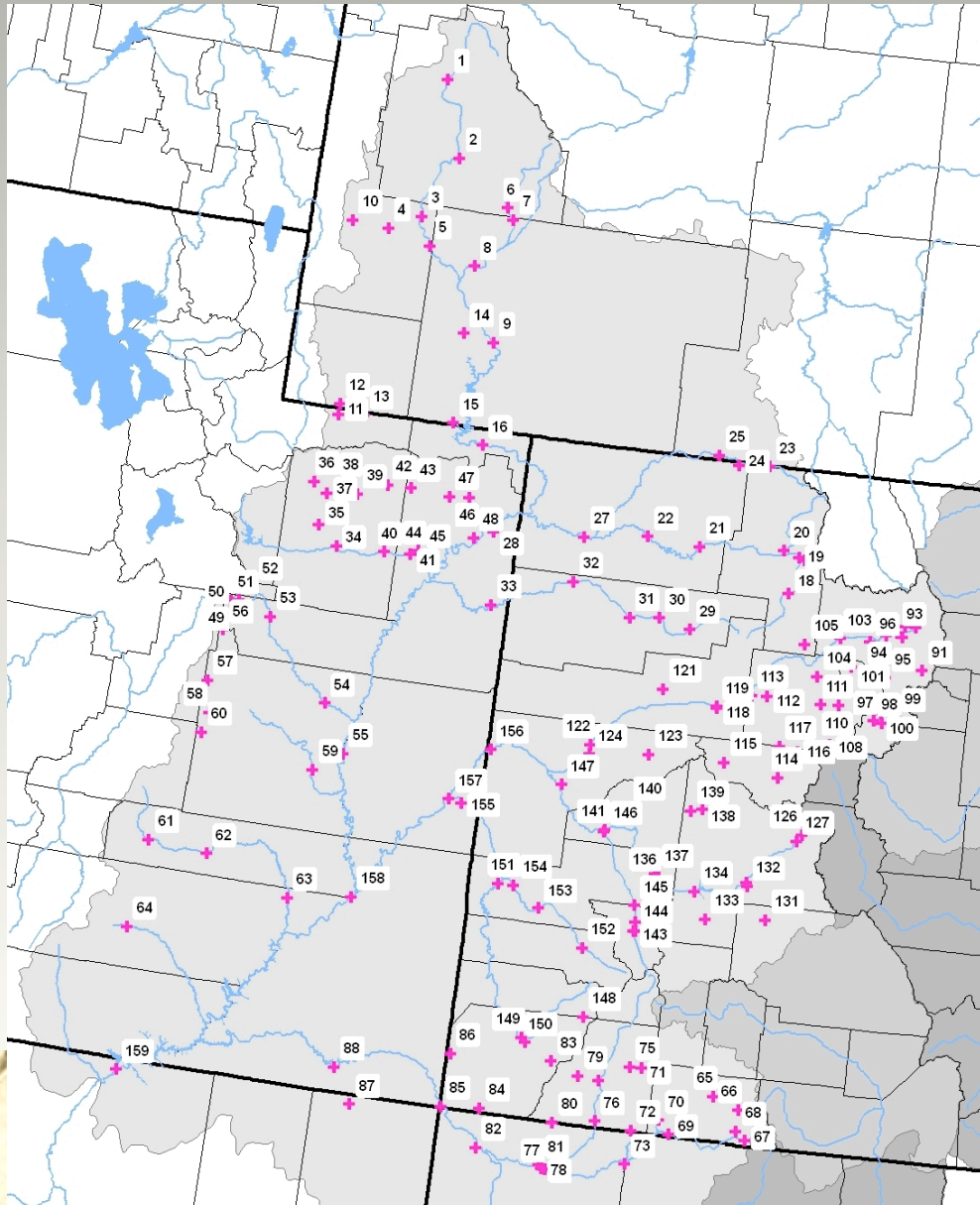


NWS SNODAS



Planning

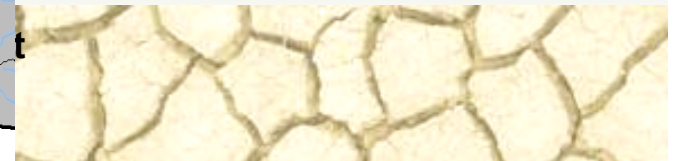
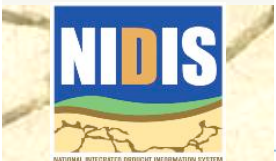
Upper Colorado River Low-Flow Impacts Database



**National Drought
Mitigation Center,
Lincoln NE**

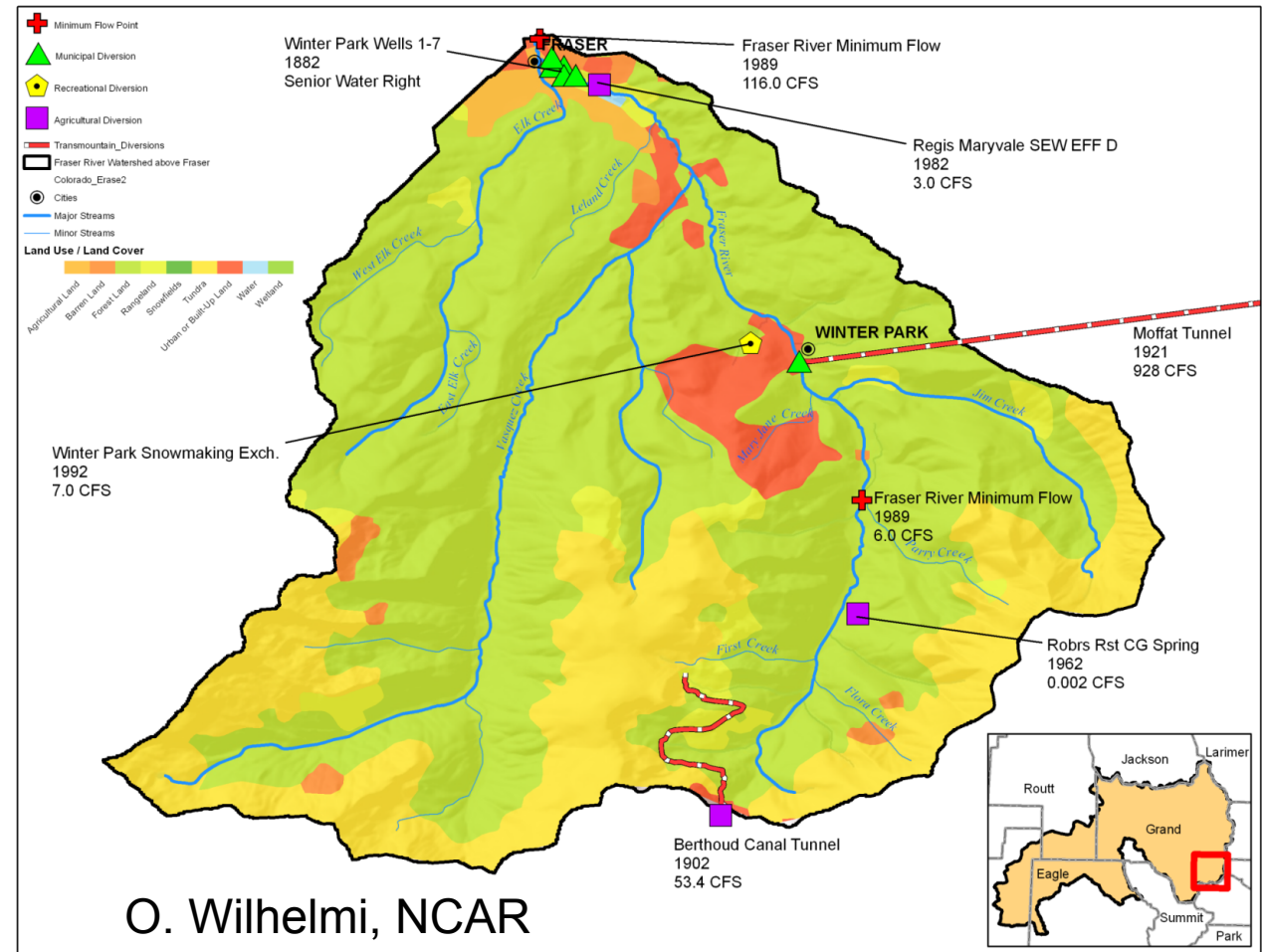
**Identified potential
low flow/stage
impacts near 164
forecast points**

**Impacts data
incorporated into
the NWS Advanced
Hydrologic
Prediction System
(AHPS)**



UCRB Water Demand Spatial Analysis

Develop drought vulnerability GIS database that represents topological relationships among water users and their respective sources of water supply



Data Mining for Water Availability, Ecosystem Change, and Societal Needs

USGS ScienceBase-Catalog: Search | Virtual Catalogs | Admin

UCRB Home > UCRB > Items | Search | New Item

Search UCRB With Filter...

Filter: Item Type is BASIS+ Project (remove)

1-10 of 55 | Next >

A Salt Loading Manila Green River - Remove from UCRB - More Info >
Project
Numerous international, federal and state laws and agreements govern the distribution of water in the...

B Muddy Creek Salinity Investigations - Remove from UCRB - More Info >
Project
Levels of dissolved solids (salts) in the Colorado River and its tributaries have increased over time as...

C Land Disturbance Energy - Remove from UCRB - More Info >
Project
Problem: The Upper Colorado River Basin (UCRB) in many areas is underlain by a thick sequence of...

D Upper Colorado River Basin Irrigated Lands Mapping - Remove from UCRB - More Info >
Project
Irrigation in arid environments can alter the natural rate at which salts are dissolved and...

Displaying results 1-55 of 55.

Land Disturbance Energy
Conduct Assessments Project
05/15/2007 - 09/30/2010

USGS
science for a changing world Data Owner: Utah Water Science Center
Project Chief: Terry A Kenney
Associate Project Chief: David D Susong, Randall J Miles, Susan G Buto, Steven J Gerner

Problem: The Upper Colorado River Basin (UCRB) in many areas is underlain by a thick sequence of Mesozoic marine and lacustrine formations that are a significant source of salinity to water resources in the basin. The past decade has seen an increased focus on energy development in the West. The Colorado River Basin Salinity Control

Show Footprint | Remove from UCRB | More Info...

Projects

Portal development sponsored by
USGS Climate Effects Network
NOAA NIDIS

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| ★ | Authors | Title | Year | Published In |
|---|-------------------|---------------------------------------------------------------|------|----------------------------|
| ★ | Albert, Steve... | Collared peccary range expansion in northwestern N... | 2004 | The Southwest... |
| ★ | Alfaro, Eric J... | Prediction of summer maximum and minimum te... | 2006 | Journal of Climate |
| ★ | Allen, J R L | Fining-upwards cycles in alluvial successions | 1964 | Geological Journal |
| ★ | Allen, Julia A... | Non-native plant invasions of United States National Parks | 2008 | Biological Invasions |
| ★ | Allred, TM; Sc... | Channel narrowing by vertical accretion along the Green Ri... | 1999 | Geological Journal of ... |
| ★ | AMMERMAN, ... | Biochemical genetics of endangered Colorado squa... | 1989 | Transactions of the Ame... |
| ★ | Amundsen, M... | Uncle Sam and the yellowcake towns: The effects of feder... | | |
| ★ | Andelt, Willia... | Long-Term Trends in Mule Deer Pregnancy and Fetal R... | 2004 | Journal of Wildlife Ma... |
| ★ | Andelt, Willia... | Occupancy of Random Plots by White-Tailed and Gunnis... | 2009 | Journal of Wildlife Ma... |
| ★ | Andersen, Do... | Characterizing flow regimes for floodplain forest conserv... | 2005 | Canadian Journal of F... |
| ★ | Andersen, Do... | Dams, floodplain land use, and riparian forest conserva... | 2007 | Environmenta Management |
| ★ | Andersen, Do... | Movement Patterns of Riparian Small Mammals dur... | 2000 | Journal of Mammalogy |
| ★ | Anderson, Da... | Factors Influencing Development of Cryptogam... | 1982 | Journal of Range Man... |
| ★ | Anderson, P S | Middle- and late-Wisconsinan | 2000 | Palaeogeograph... |

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Type: Journal Article

Collared peccary range expansion in northwestern New Mexico
S. Albert, C. Ramotnik, C. Schmitt
The Southwestern Naturalist
Year: 2004
Volume: 49
Issue: 4
Pages: 524-528

Abstract
We report new records of collared peccary (Pecari tajacu) in New Mexico that document its continued northward expansion in the United States, in general, and in northwestern New Mexico, in particular. These records might represent the northernmost extent of its range in the Southwest. Collared peccaries in New Mexico typically occur in desert, rocky, and brushy foothill regions and riparian communities. On the Zuni Indian Reservation, animals were observed at elevations up to 2,335 m in piñon-juniper and ponderosa pine habitats. Climate might play an important role in range expansion and contraction as collared peccaries might migrate north during years of drought or mild winters in search of food or new habitat.

Tags

Author Supplied Keywords

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Beth Middleton, Ph.D
Research Ecologist, National Wetlands Research Center, USGS
Lafayette, Louisiana, United States

Research field: Biological Sciences - Botany
wetland ecology, climate change, landscape ecology, regeneration dynamics, wetland function

Publications

▼ **Book (1)**
Beth A Middleton (1999) *Wetland restoration, flood pulsing and disturbance dynamics*. In Wiley, New York.
books.google.com/books?id=Zv_sJg7dM8...

▼ **Journal Article (3)**
Middleton Beth A (2009) *Regeneration of coastal marsh vegetation impacted by Hurricanes Katrina and Rita, 54-65*. In *Wetlands*.
www.bioone.org/doi/pdf/10.1672/08-18.1

All Publications
[http://profile.usgs.gov/professional/...](http://profile.usgs.gov/professional/)
Middleton Beth A, Devin D, Proffitt E et al. *Characteristics of mangrove swamps managed for mosquito control in eastern FL, 117-129*. In *Marine Ecology Progress Series*.
www.int-res.com/articles/mps/mps_oam371...

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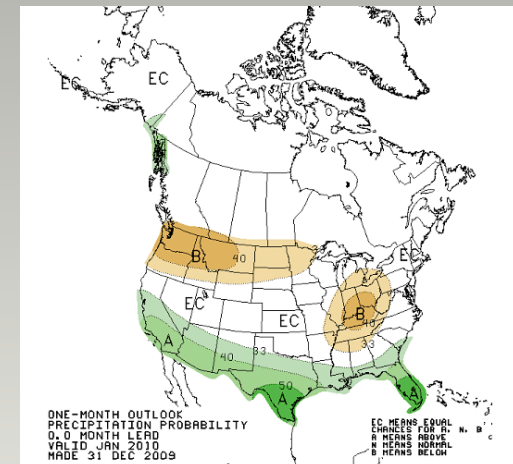
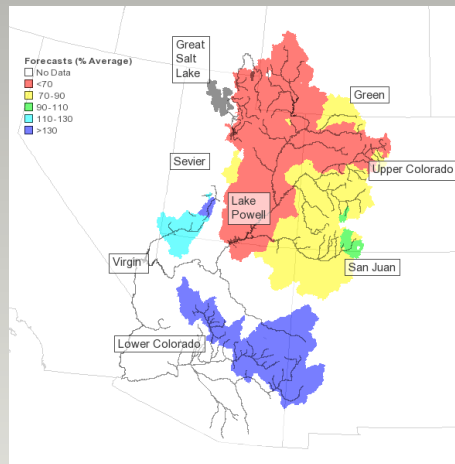
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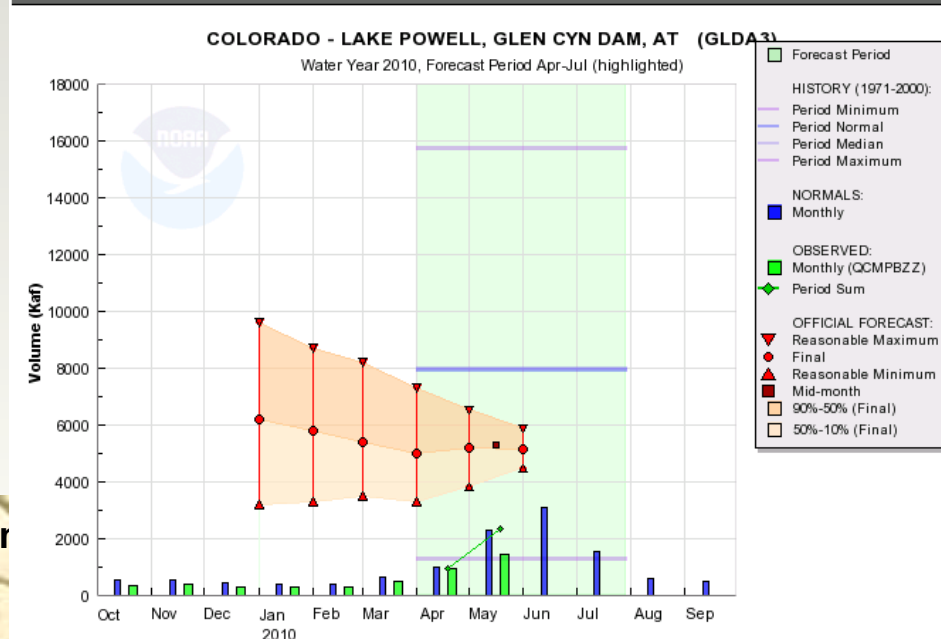
NWS CBRFC Water Supply Webinars

Basin Conditions
Climate forecasts

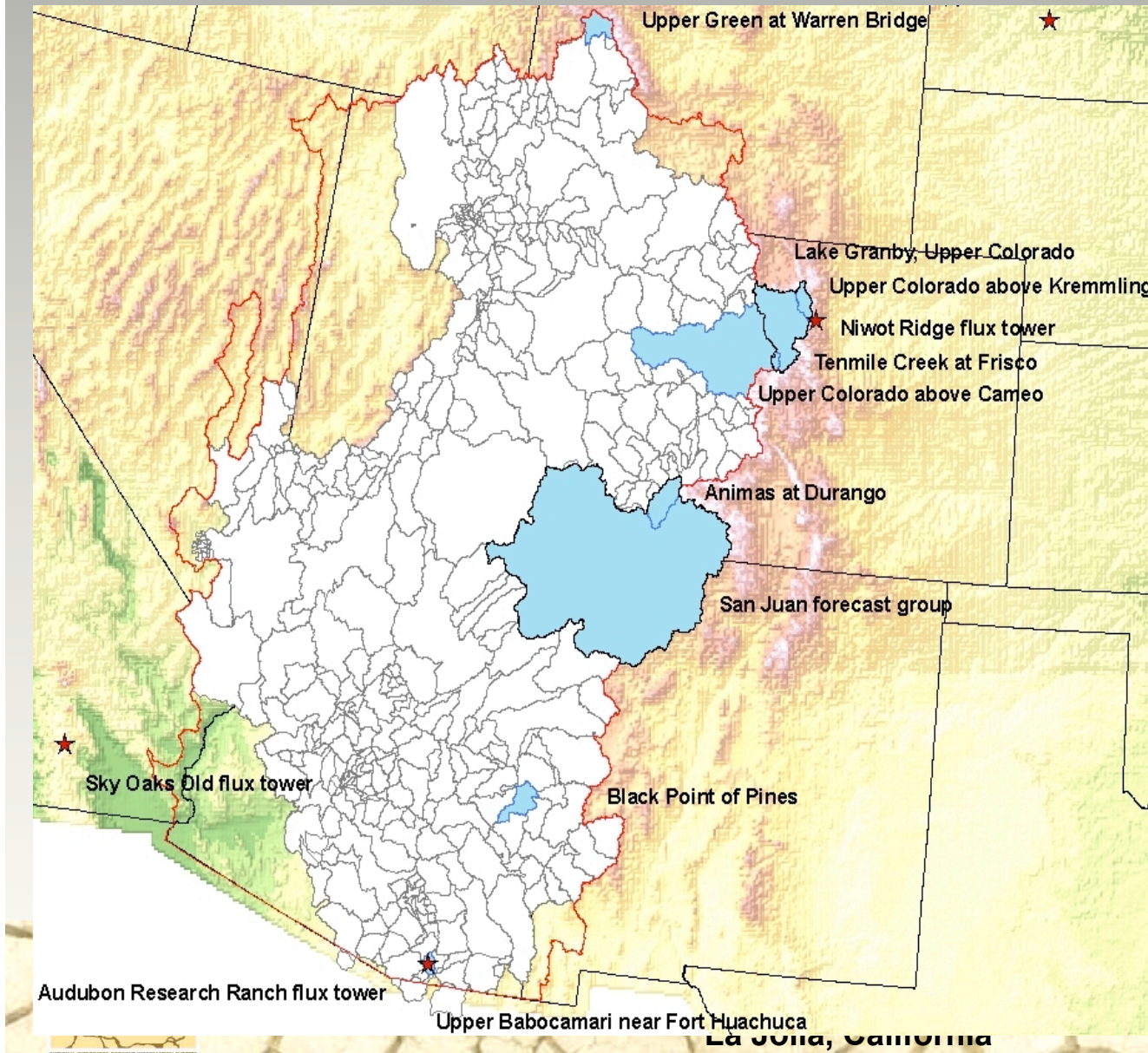
Streamflow forecasts



Jun 01 2010 Forecast: 5150 kaf (65% of normal)
Range: 4480-5880 kaf (56 - 74% of normal)



Improved Colorado River Water Supply Forecasts



- NWS CBRFC, CPC, and OHD
- Linking climate and hydrological models
- CFS dynamically downscaled with RSM as input to CBRFC ESP
- Improved treatment of evapotranspiration (dynamic vs. climatological)

Drought Preparedness for Tribes in the Four Corners Region Workshop

April 8-9, 2010, Flagstaff, Arizona

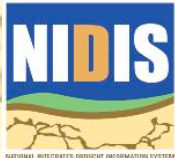
Tribal perspectives on critical issues

Local Knowledge & Drought: How do we incorporate local knowledge?

What are current vulnerabilities and impacts tied to drought and climate change?


Critical drought-related information needs on tribal lands in Four Corners region

Improved monitoring emerged as a high priority near-term need



Planning the NIDIS California Pilot
September 23, 2010
La Jolla, California

UCRB Community on the Drought Portal (NCDC)


National Integrated Drought Information System
 Regional Drought Early Warning System
 Upper Colorado River Basin

[Home](#)

Area Drought Info
 Select State within the DEWS
 [Go](#)
 Select Other Regional DEWS
 [Go](#)

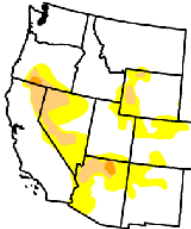
Related Information

- NIDIS Weekly Drought Webinars
- Tribal Resources
- Ongoing Research & Development

Upcoming Meetings
[To Be Determined](#)
 When: TBD
 Where: TBD

Past Meetings
[Expand All / Collapse All](#)

- UCRB Pilot Planning meeting for Federal Partners
- UCRB Scoping Workshop
- UCRB Monitoring Gaps Workshop
- UCRB Partners Update Meeting

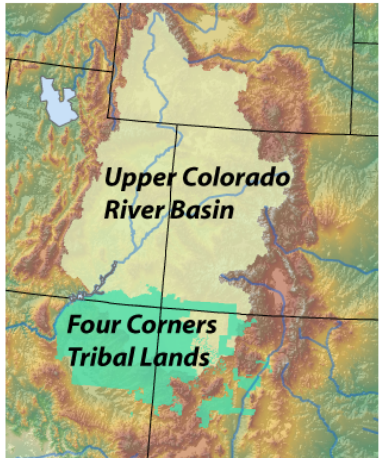
Featured Products
[Current Conditions](#) [Impacts](#) [Forecast](#)
U.S. Drought Monitor September 14, 2010
 West


| | Current | D0 | D1 | D2 | D3 | D4 |
|------------------------|---------|------|------|-----|-----|-----|
| Current | 75.5 | 27.2 | 6.8 | 0.6 | 0.0 | 0.0 |
| Last Week (10/05/09) | 75.5 | 26.6 | 6.3 | 0.6 | 0.0 | 0.0 |
| 10-Year Avg (10/05/09) | 66.5 | 33.5 | 11.0 | 1.0 | 0.0 | 0.0 |
| 10-Year Avg (10/05/09) | 60.1 | 39.0 | 30.5 | 9.0 | 0.5 | 0.0 |
| 10-Year Avg (10/05/09) | 42.1 | 27.8 | 20.4 | 8.0 | 0.0 | 0.0 |
| 10-Year Avg (10/05/09) | 19.4 | 20.0 | 23.7 | 7.7 | 0.0 | 0.0 |

Legend: D0 (Severe Drought), D1 (Extreme Drought), D2 (Exceptional Drought), D3 (Outstanding Drought), D4 (Exceptional Drought)

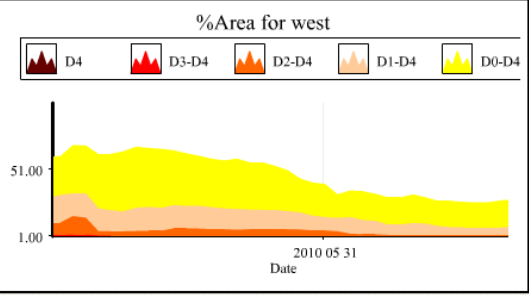
The Drought Monitor forecasts are based on the current conditions. Current conditions may vary. See accompanying text summary for additional information.

Released Thursday, September 16, 2010
 Author: M. Anderson, CPC/NCEP

Upper Colorado River Basin


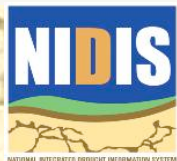
Drought in the News

-

Drought Monitor Time Series - West
 %Area for west


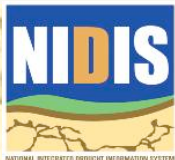
Drought Classifications | [Larger View](#)

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Thank you



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